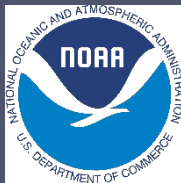
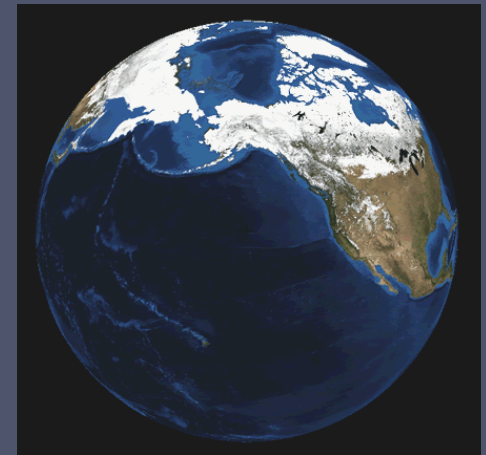


ECOSYSTEM CONSIDERATIONS REPORTS FOR ALASKA'S GROUNDFISH MANAGEMENT



Stephani Zador
Alaska Fisheries Science Center
NMFS, NOAA



NOAA Fisheries Mission

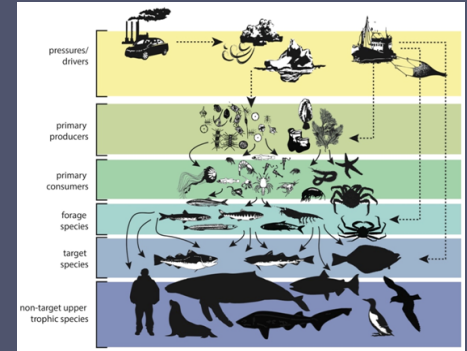
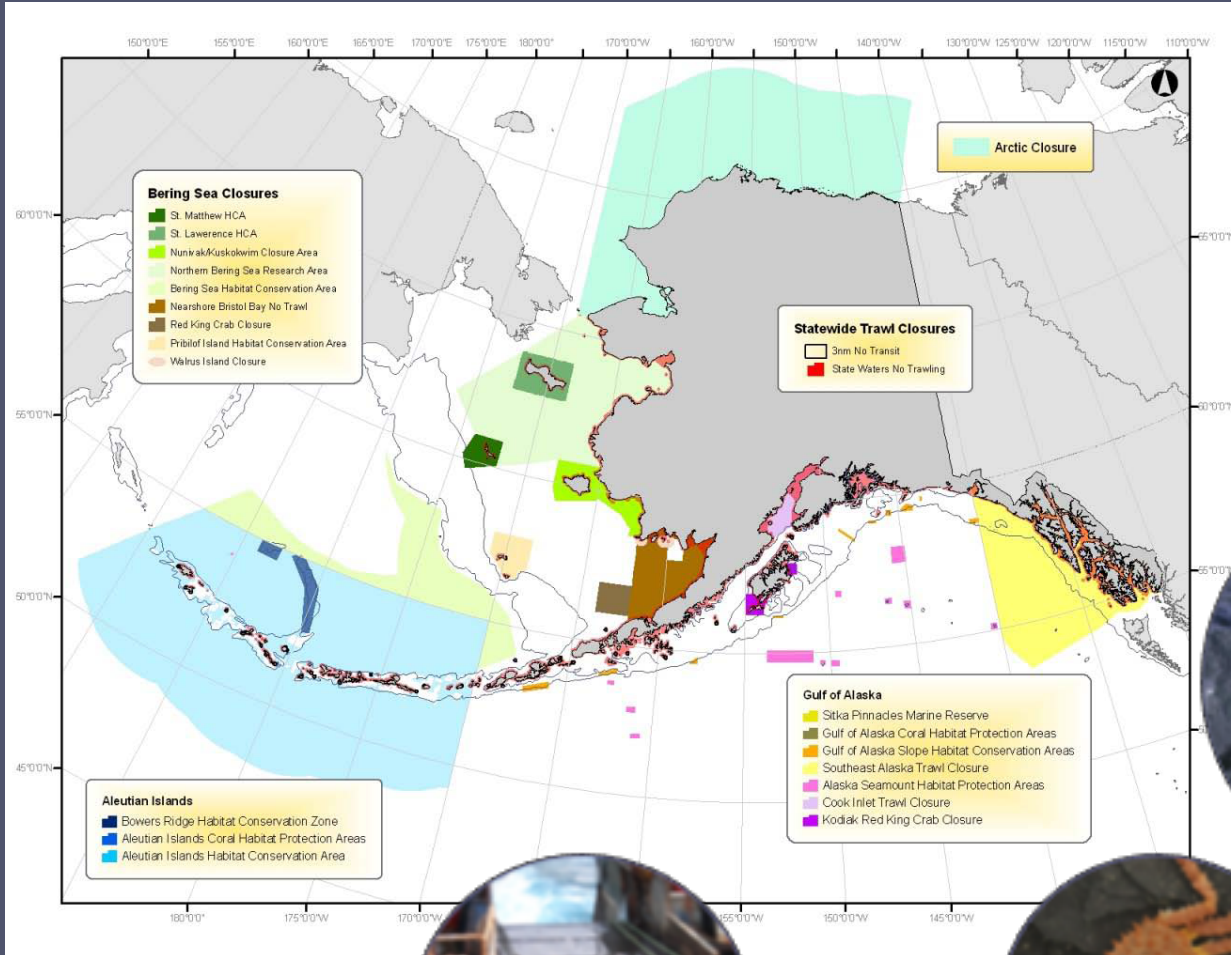
Stewardship of the nation's ocean resources
and their habitat

Providing vital services for the nation:
productive and sustainable fisheries, safe
sources of seafood, the recovery and
conservation of protected resources, and
healthy ecosystems—all backed by sound
science and an **ecosystem-based approach to
management**

How does the Fisheries Council balance competing interests?



There are a variety of ways we do this in Alaska

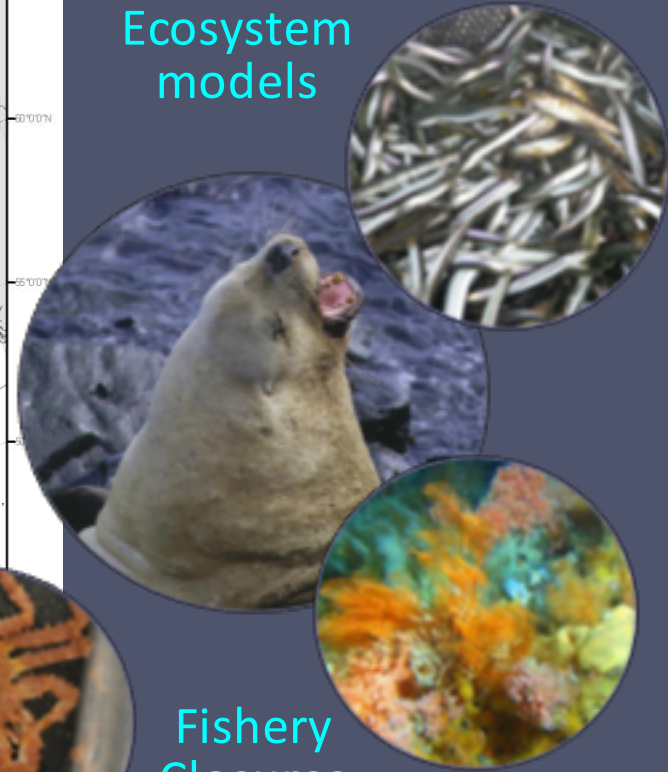


Ecosystem models

Gear modification



Fishery Closures





The Ecosystem Considerations Reports

- Indicator-based assessments
- EBS, GOA, AI (and Arctic)
- Targeted for managers
- Linked with stock assessments

Ecosystem Considerations 2016

Status of the Gulf of Alaska Marine Ecosystem



Edited by:
Stephanie Zador¹ and Ellen Yuenmueller²

¹Resource Ecology and Fisheries Management Division, Alaska Fisheries Science Center,
National Marine Fisheries Service, NOAA
7600 Sand Point Way NE
Seattle, WA 98116

²Ank Bay Laboratory, Alaska Fisheries Science Center,
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With contributions from:

Sonia Battou, Nick Bond, Kristina Cieciel, Sheri Drexler, Dailly Dergussou, Nissa Fern, Shamaou
Pitzgenild, Madelyn Friesdson, Sarah Gidichus, Jeanette Gan, Andrew Gray, Dana Harschman, Brad
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Laura Rogers, Nora Rojek, Joshua Russell, Anna Santos, Kalvi Shewell, Leslie Slater, Wes Stru-
burger, Scott Valerak, Alex Wertheimer, Andy Whitehouse, Carrie Worton, Ellen Yasmitsch, and
Stephanie Zador

Reviewed by:
The Plan Teams for the Groundfish Fisheries of the
Bering Sea, Aleutian Islands, and Gulf of Alaska
November 11, 2016
North Pacific Fishery Management Council
605 W. 4th Avenue, Suite 306 Anchorage, AK 99501

Ecosystem Considerations 2016

Status of the Aleutian Islands Marine Ecosystem



Edited by:
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Reviewed by:
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Ecosystem Considerations 2016

Status of the Eastern Bering Sea Marine Ecosystem



Edited by:
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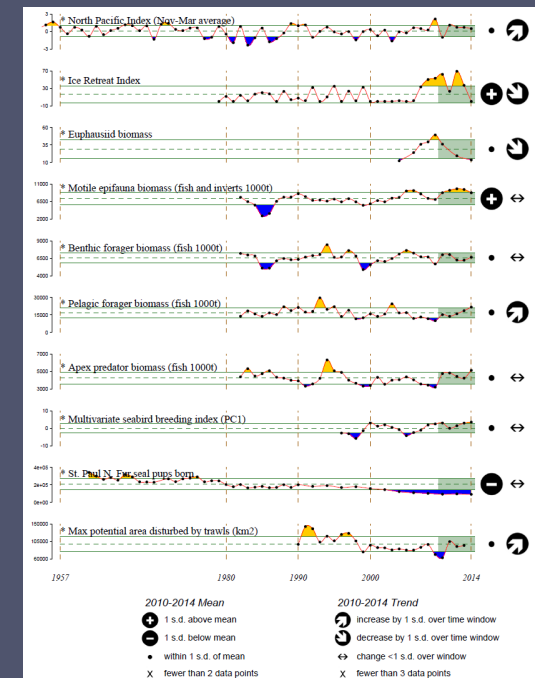
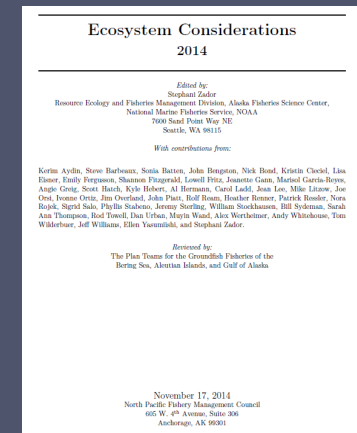
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Stephanie Zador

Goals and Objectives

- Synthesis of ecosystem(s) status
- Provides context for EAF/EBFM
- Spurs discussion, which can influence the quota-setting process

A brief history of the reports

- Produced annually since 1995
- Evolved since then
 - 1995: *a compendium of general information on EBS, AI and GOA ecosystems and a general discussion of ecosystem-based management.*
 - 2016: Report Cards, Hot Topics, assessments, indicators, etc. for EACH LME
- Adaptive documents
 - Revised annually in response to review and new information available
 - New indicators every year



Report Outlines

Major Sections (2016 reports, ~100-200 p)

- Report Cards (1-3 p)
 - EBS
 - Western, Central and Eastern AI
 - Western and Eastern GOA
- Ecosystem Assessments (~15 p)
- Ecosystem Status and Management Indicators (70-160 p)

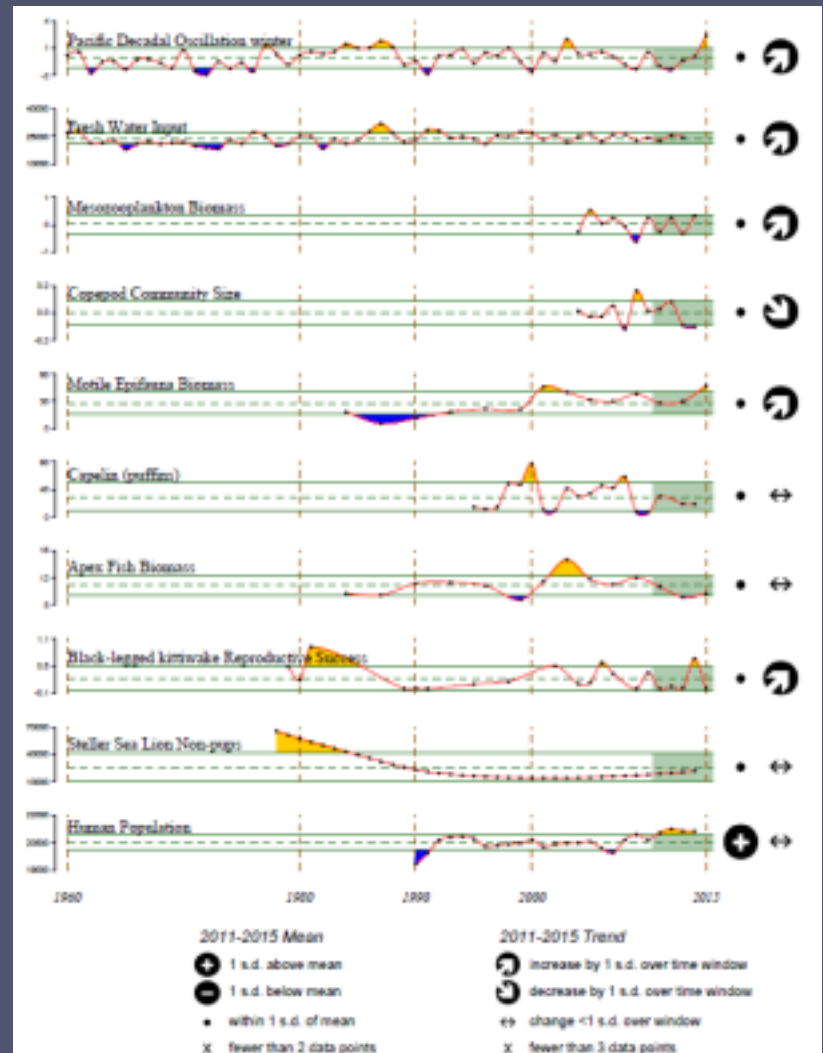
Increasing
level of detail



Bulleted text and standard time series format present concise summary of ecosystem status

Gulf of Alaska 2015 Report Card

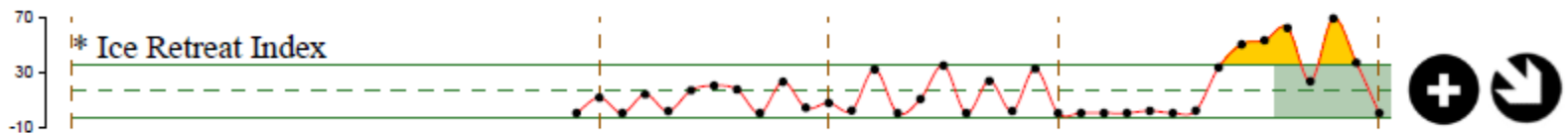
- The Gulf of Alaska in 2015 was characterized by warm conditions that were first seen in 2004, and continued through the winter, during which the PDO reached the highest winter value seen in the record extending back to 1900.
- Fresh water input as estimated at the GAKI station has been variable over the long time series. The most recent data indicate an increasing trend.
- Mesozooplankton biomass measured by the continuous plankton recorder has shown a biennial trend since 2009, with higher biomass recorded during even-number years. Biomass trends can be influenced by ecosystem conditions and mean size of the community. This suggests that prey availability for planktivorous fish, seabirds, and mammals has been variable recently. The biennial pattern suggests a possible link with biennially varying planktivorous pink salmon abundance.
- Copepod community size has been declining in recent years. The prevalence of small copepods during 2014 fits predictions of warm conditions favoring small copepods. This suggests that less lipid-rich prey were available to planktivorous predators.
- Survey biomass of motile epifauna has been above its long-term mean since 2001. The increase from 1987 to 2001 was driven by hermit crabs and brittle stars, which dominate the biomass. Since 2001 their biomass has been stable. Recent catches of octopus influenced the increased estimate in 2015.
- Trends in capelin captured by tufted puffins at the Barren Islands have been variable in the 20 year time series. Capelin comprised the majority of chick diets in 2009 and were generally abundant from 2003 - 2008, but have been at or below the mean since that time. It is unknown whether these trends reflect capelin abundance or prey preferences of the puffins.
- Fish apex predator survey biomass is currently below its 39-year mean, although the declining trend seen in recent years has leveled off. The trend is driven primarily by arrowtooth flounder which, along with halibut, had been declining since 2005. Both increased slightly in 2015. It is unknown whether these increases were due to distributional shifts in the warm water. Pacific cod has declined from a peak survey biomass in 2009.
- With the exception of 2014, black-legged kittiwake reproductive success has been poor in the Semidi Islands, indicating that conditions were not favorable for these surface-feeding piscivorous seabirds. This may reflect poor conditions prior to the breeding season, during, or both.
- Modelled estimates of total Gulf of Alaska Steller sea lion non-pups counts are approaching the long term mean. This slowly increasing pattern since 2000 reflects the combination of increasing trends in the eastern population with declining trends in the western population.
- Human populations in the Gulf of Alaska coastal towns of Homer, Kodiak, Sitka, and Yakutat are above their 25 year mean. Homer is the sole town with a steadily increasing trend. Kodiak saw declines until 2006 and has recovered slightly since then.



What makes a *good* indicator?

1. Knowing what the indicator indicates
2. Sensitive to change
3. Useful for management

This means *timely* and *current* to inform **annual** management quota-setting



Indicator Categories

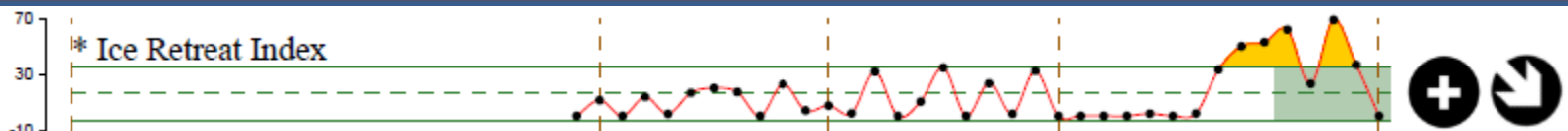
Ecosystem Status

- Physical
- Phytoplankton
- Zooplankton
- Forage fish
- Herring
- Salmon
- Groundfish
- Benthic Communities and Non-Targets
- Seabirds
- Marine Mammals
- Ecosystem or Community Indicators

Ecosystem-Based Management

- Discards and Non-Target
- Fish Habitats
- Sustainability
- Humans

Types:
Observations
Model-based
Multivariate



Indicator “contributions”

1 page of text and 1 or 2 figures and/or tables.

1. Description of indicator
2. Status and trends
3. Factors influencing observed trends
4. Implications for fisheries management

 The *So What?*

Indicator Selection

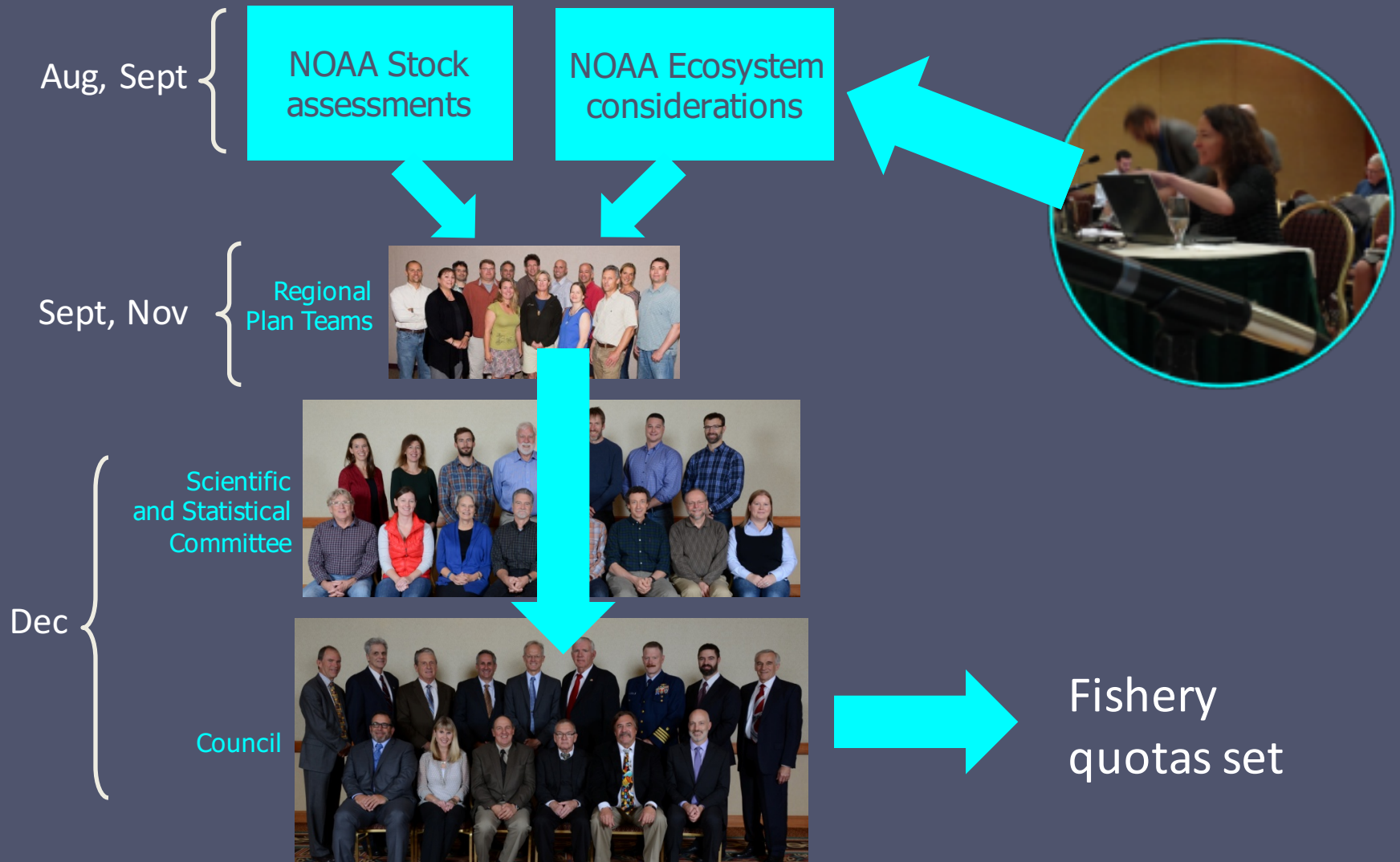
For Report Cards, indicator selection has been by expert group selection (in person workshops and/or online query)

All other indicators are requested, selected, discontinued or developed by the editors and/or requests from the Council

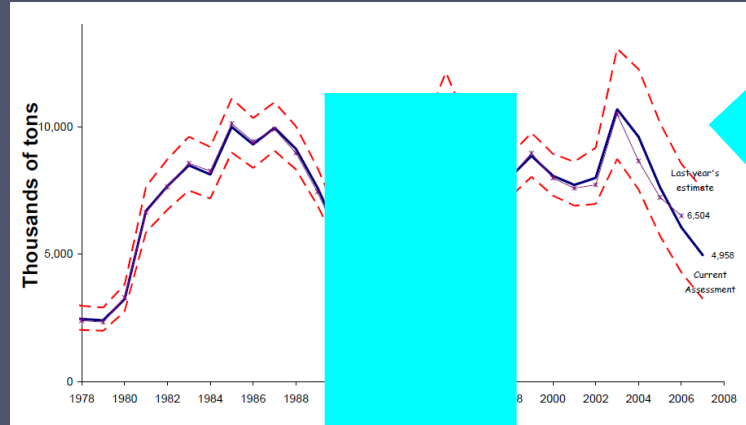
The Ideal Indicator for our reports

- Fills gaps in or improves current indicator suite
- Characterized at annual scales
- Long-term time series and/or likely to be measured for many years
- Available for current year or year before (at most)

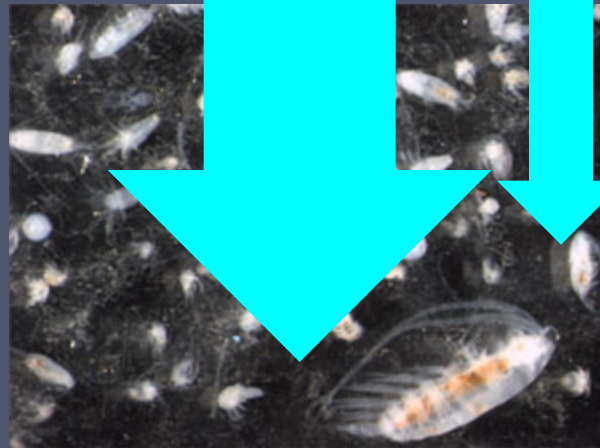
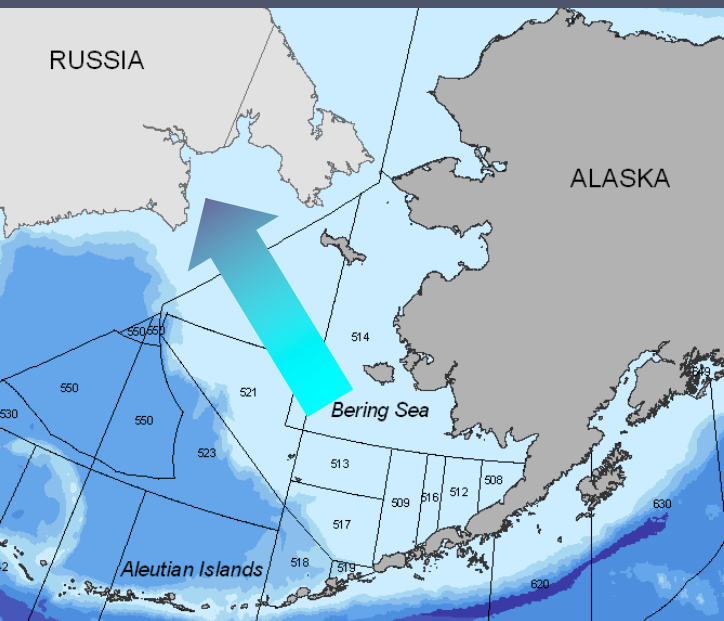
So how does this work in our fisheries management system?



An example



Pollock declining



Quota reduced



Strengths

- Increased discussion of ecosystem impacts
- Allows for rapid incorporation of unexpected and new information to management process
- Reports are highly adaptive to managers' needs and requests
- Information has been used to adjust quotas

Lessons learned

- Understand the management system/user groups
- Adapt ecosystem information to the Council needs (timing)
- Vary levels of details
- Use standard formats for time series and text
- “Inform, but don’t overwhelm”
- Frequent interaction leads to transparency and trust